Effective dose estimation during pediatric chest X ray radiography

A thesis submitted in partial fulfillment for the requirements of Master degree in Medical Physics

By:

Omer Osman Omer Mohammed

Supervisor

Dr. Abdelmoneim Adam Mohamed Sulieman

Associate Professor

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Dedication

To:

My parent for their patience and encouragement

My brothers, sisters and teachers for their help and support

My friends for their valuable supports

I dedicate this work
Acknowledgment

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Abstract:
Radiation doses to patients from chest X ray radiography which is the most common paediatric X-ray examinations were studied in two hospitals (MO) and (IB) in Khartoum state, Sudan. Entrance surface dose (ESD) was determined from exposure settings using DosCal software. Totally, 126 patients were included in this study. Mean ESDs obtained from for pediatric chest radiography in (MO) hospital recorded in this work was 0.049, 0.058, 0.100 and 0.054 mGy for the patients aged between 0-1, 1-3, 3-5 years and total sample respectively, and was 0.031 mGy for aged group in (IB) hospital.

The mean ESDs per chest radiographic image ranged between 0.054 and 0.031 mGy in (Mo) and (IB) respectively per exposure, which is slightly lower than the corresponding values reported in the DRLs reported in European guidelines on quality criteria for diagnostic radiographic images EUR 16260EN As demonstrated in the discussion, patients’ doses were high in departments using single-phase generators compared with those using constant potential. The results presented will serve as a baseline data needed for deriving reference doses for pediatrics X-ray examinations in Sudan. The mean organ equivalent dose assessed from ESDs measured values for (MO) and (IB) using CHILDOSE (NRPB-SR279) to lung, breast, thyroid, liver, kidney, bladder, stomach and testis was 0.021, 0.039, 0.026, 0.013, 0.002, 0.006, 0.0013 and 0.00001 mSv for (MO), 0.0120, 0.0293, 0.0149, 0.0076, 0.012, 0.0034, 0.074 and 0.0000076 mSv for (IB) respectively. The overall effective dose obtained from this study 0.0092 and 0.0053 mSv for (MO) and (IB) respectively.
الملخص

الاستخدام الطبي للأشعة السينية هو من أكبر مصادر تعرض الإنسان للأشعة في الوقت الحاضر. لذلك يجب تجنب استخدام الأشعة بصورة مفرطة أو بجرعات أعلى مما هو مطلوب لعمل الفحص المحدد. مؤخرًا، زاد الاهتمام بمخاطر الأشعة وخاصة السرطان نتيجة للتعرض الطبي للأشعة.

هدفت هذه الدراسة إلى قياس الجرعة الإشعاعية للمرضى أثناء فحوصات الأشعة السينية في مستشفيين بولاية الخرطوم. لتقييم الجرعة الكافية للاعضاء المختلفة وكذلك الجرعة المكافئة وتقييم خطر الإشعاع الناجم عن فحوصات الصدر للأطفال بواسطة الأشعة السينية. قبضت الجرعة الإشعاعية باستخدام جهاز انفوس. (Unfors)

تم قياس جرعة الإشعاع لعدد 126 مريض في كل من المستشفيات الآتية: محمد الأمين – أم درمان ومستشفى جعفر ابنعوف للأطفال.

خلصت هذه الدراسة إلى أن الجرعات الإشعاعية للمرضى متقاربة مع الدراسات السابقة. هذه الدراسة تتوفر معلومات أساسية عن مستوي الجرعات الإشعاعية للمرضى بهذه المستشفيات. لوحظ أن هناك اختلاف كبير بين قيام الجرعات الإشعاعية للفحص الواحد. يعزى ذلك اختلاف الأجهزة وطريقة الفحص بالإضافة إلى كفاءة تقني الإشعة ووزن المريض. هذه الدراسة تؤكد على أهمية برنامج ضبط جودة فعال في هذه المستشفيات ووضع مستويات مرجعية للأشعة.